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Mortality from Diabetes Mellitus, Ischemic Heart Disease, and Cerebrovascular Disease Among Blacks in a Higher Income Area

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Synopsis

According to the 1980 census, blacks in Suffolk County on Long Island, NY, had a median family income of almost \$20,000 versus \$12,618 for blacks in the entire United States, or only 20 percent lower than that for whites in the county. Black-white ratios of age-

specific death rates for 1979-83 in Suffolk County were elevated for all causes for men and women in age groups from 35-44 to 55-64 years (but not for those 75 years or older), for ischemic heart disease for women (but not men) for age groups from 35-44 to 55-64 years, for diabetes mellitus for most ages (especially for females), and for cerebrovascular disease for both men and women for all age groups from 35-44 to 65-74 years.

The age-specific proportional mortality ratios (PMRs) for ischemic heart disease within educational level (less than 12 years and 12 or more years of school) were lower for black than for white men but more similar for black and white women. For diabetes, the PMRs were higher for black versus white women within both educational levels. PMRs for cerebrovascular disease were higher for black than white men within the group of decedents with less than 12 years of education. The findings are discussed with reference to racial differences in the prevalence of poverty as well as possible differences in risk factors (for example, obesity) or medical care independent of poverty.

STUDIES HAVE REPORTED black-white differences in mortality in economically depressed areas in Chicago (1), Alameda County (2), and Newark (3). Differences in socioeconomic status (SES) and poverty level are major explanations for black-white differences in total mortality (4) and in mortality for certain causes of

death. An ecologic study in Philadelphia (5), however, showed that higher death rates in geographic areas containing low-income groups or higher proportions of blacks did not hold for ischemic heart disease for both sexes or for diabetes mellitus for males.

There is increasing interest in geographic differences

Table 1. Socioeconomic characteristics of blacks and whites in Suffolk County, NY, versus the United States

Characteristic and area	Whites	Blacks	$W - B \div W^1 \times 100$ (percent)
Median family income:			
Suffolk County	\$24,484	\$19,604	20
United States	20,840	12,618	39
Mean family income:			
Suffolk County	\$27,254	\$20,909	23
United States	24,279	15,721	35
Percentage earning less than \$7,500:			
Suffolk County	7.0	17.0	-143
United States	11.0	30.4	-176
Percentage earning \$7,500-\$19,999:			
Suffolk County	28.7	34.2	-19
United States	36.2	40.1	-11
Percentage earning \$20,000-\$49,999:			
Suffolk County	56.6	46.0	19
United States	46.5	27.5	41
Percentage earning \$50,000 or more:			
Suffolk County	7.8	2.9	63
United States	6.2	1.9	69
Below poverty level:			
Suffolk County	5.8	17.7	-205
United States	9.4	30.2	-221
Percentage high school graduates ages 25 or older:			
Suffolk County	74.5	60.8	18
United States	68.7	50.6	26

¹W = white; B = black.

SOURCES: References 9 and 10.

in current death rates and in time trends in rates for chronic diseases, such as ischemic heart disease (6) and in risk factors—as evidenced in the data collected by the Behavioral Risk Factor Surveillance System in 33 States since 1987 (7, 8). Racial differences in chronic disease mortality by regions of varying socioeconomic level have received less attention. In Suffolk County, on Long Island, NY, part of the Nassau-Suffolk Standard Metropolitan Statistical Area, the black-white difference in median family income in the 1980 census (9, 10) was about half that in the United States (20 versus 39 percent; table 1) and the income difference was similar in magnitude from ages 35–44 to 65 or more years (that is, 15–23 percent, not shown).

Suffolk County blacks had considerably higher average family incomes than blacks in the entire United States, while Suffolk County whites had slightly higher incomes than whites in the entire United States (table 1). The greatest difference between Suffolk County and the United States in black-white disparities in family incomes was at the mid-range—the \$20,000–\$49,999 level. The black-white disparity in educational level was also lower in Suffolk County compared with the remainder of the United States. On the other hand, while the proportions of Suffolk County blacks and

whites below the poverty level were lower than that for the United States, the black-white disparity in Suffolk County for poverty prevalence was almost as large as that for the United States (table 1).

This report presents age- and sex-specific death rates for black versus white residents of Suffolk County for all causes of death and for diabetes mellitus, ischemic heart disease, and cerebrovascular disease. Previous studies have shown that use of age-adjusted rates may obscure important black-white mortality differences by age group (1, 2, 5, 11). Proportions of deaths from these causes were also examined by race within educational level.

Methods

Computer files with individual records (without personal identifiers) of all deaths in Suffolk County during 1979–83 were provided by the Suffolk County Department of Health Services; causes of death had been coded to the 9th Revision of International Classification of Diseases (ICD) (12). Deaths recorded in the county of nonresidents were excluded.

The chronic diseases included in this report were diabetes mellitus (ICD 250), coronary (or ischemic) heart disease (ICD 410–414), and cerebrovascular disease (ICD 430–438). Because the numbers of deaths from these causes were small prior to age 35 years (especially among blacks), the present analyses were restricted to ages 35 or older (that is, 35–44, 45–54, 55–64, 65–74, and 75 or more years). Mortality rates from all causes are also presented for these age groups to indicate the contributions of these selected causes to overall mortality.

Numerators (deaths) were based on the “race” item on death certificates, which is accurate on the basis of earlier studies using matched death-census records (1) and the finding of 99.6 percent agreement between death certificates and hospital records in New York State (13). Population denominators for Suffolk County were obtained from the 1980 census (9). The total population of the county in 1980 was 1,185,109 whites and 58,689 blacks (or 5 percent blacks) of all ages and 502,822 whites and 18,903 (or 3.6 percent) blacks 35 or more years of age.

Average annual age-specific death rates were expressed per 100,000 population for blacks and whites. Although population estimates were not available for 1981–83 by race and age, total population trends in Suffolk County have indicated only slight increases in the proportion of blacks over longer periods, so that black-white mortality ratios should not be affected greatly by using 1980 population data for 1979–83.

Table 2. Average annual age-specific mortality rate (per 100,000) for all causes and for selected chronic diseases in blacks and whites in Suffolk County, NY, 1979–83

Age (years)	Whites		Blacks		Black-white ratio and 95 percent confidence limits
	Number	Rate	Number	Rate	
All causes—women					
35–44	509	126.1	81	303.4	2.41 (1.92–3.01)
45–54	1,280	383.6	148	834.7	2.18 (1.85–2.57)
55–64	2,542	974.5	160	1,292.4	1.33 (1.14–1.56)
65–74	4,577	2,391.5	197	2,630.2	1.10 (0.95–1.27)
75 or more	11,966	8,221.2	286	5,995.8	0.73 (0.65–0.82)
Diabetes mellitus—women					
35–44	10	2.5	1	3.8	...
45–54	9	2.7	5	28.2	10.44 (3.38–24.39)
55–64	57	21.9	11	88.9	4.06 (2.03–7.27)
65–74	129	67.4	9	120.2	1.78 (0.82–3.38)
75 or more	283	194.4	26	545.1	2.80 (1.83–4.12)
Ischemic heart disease—women					
35–44	36	8.9	9	33.7	3.79 (1.74–7.20)
45–54	155	46.5	18	101.5	2.18 (1.29–3.44)
55–64	545	208.9	45	363.5	1.74 (1.27–2.33)
65–74	1,408	735.7	51	680.9	0.93 (0.69–1.23)
75 or more	5,283	3,629.7	105	2,201.3	0.61 (0.50–0.74)
Cerebrovascular disease—women					
35–44	25	6.2	5	18.7	3.02 (0.98–7.06)
45–54	63	18.9	12	67.7	3.58 (1.84–6.25)
55–64	127	48.7	12	96.9	1.99 (1.03–3.47)
65–74	300	156.8	26	347.1	2.21 (1.44–3.24)
75 or more	1,575	1,082.1	49	1,027.3	0.95 (0.70–1.39)
All causes—men					
35–44	783	207.0	114	513.3	2.48 (2.03–3.00)
45–54	1,982	591.0	191	1,163.6	1.97 (1.71–2.28)
55–64	4,168	1,677.0	276	2,528.6	1.51 (1.34–1.70)
65–74	5,943	4,216.8	251	4,415.1	1.05 (0.93–1.19)
75 or more	8,400	11,074.5	258	9,828.6	0.89 (0.79–1.01)
Diabetes mellitus—men					
35–44	8	2.1	1	4.5	...
45–54	21	6.3	5	30.5	4.84 (1.57–11.31)
55–64	88	35.4	7	64.1	1.81 (0.73–3.73)
65–74	137	97.2	7	123.1	1.27 (0.51–2.06)
75 or more	146	192.5	7	266.7	1.39 (0.56–2.87)
Ischemic heart disease—men					
35–44	185	48.9	11	49.5	1.01 (0.50–1.81)
45–54	695	207.2	35	213.2	1.03 (0.72–1.47)
55–64	1,539	619.2	76	696.3	1.12 (0.80–1.41)
65–74	2,178	1,545.4	74	1,301.7	0.84 (0.66–1.06)
75 or more	3,407	4,491.8	89	3,390.5	0.75 (0.61–0.93)
Cerebrovascular diseases—men					
35–44	17	4.5	6	27.0	6.00 (2.20–13.07)
45–54	54	16.1	10	60.9	3.78 (1.82–6.95)
55–64	146	58.7	19	174.1	2.97 (1.79–4.64)
65–74	300	212.9	19	334.2	1.57 (0.95–2.45)
75 or more	821	1,082.4	29	1,104.8	1.02 (0.68–1.47)

¹Black-white mortality ratio significantly ($P < .05$) different from 1.00; where the number of deaths in blacks was less than 5, ratios were not shown. For ICD codes, see text.

'Deaths due to diabetes mellitus for black men were few; the black-white ratio was consistently elevated at all ages but statistically significant only for age 45–54. In contrast to women, black-white ratios for ischemic heart disease were not significantly elevated for men and decreased only with advancing age.'

Denominators for blacks are subject to inaccuracies due to undercounting in the census—probably greatest for black men 40–44 and 45–49 years of age (that is, 19 percent undercount) but low (that is, 3–6 percent) for black females and white males (14). Thus, death rates may be overestimated for black men 40–49 years old for the United States—and presumably Suffolk County—while rates for women would be less affected. Limitations of death certificates concerning cause of death are well known and accuracy may vary by race, as suggested for ischemic heart disease in U.S. blacks compared with whites (15).

Number of years of education was recorded on death certificates for most decedents 35 or more years of age at death (that is, 89 percent of whites and 83 percent of blacks). Because population estimates by education, age, and race were not available for Suffolk County, proportional mortality ratios (PMRs) were calculated by educational category (that is, less than 12 and 12 or more years) for blacks and whites by age group for each sex. The ratio of age-specific rates in blacks and whites, or the ratio of observed number of deaths in blacks to the number expected (on the basis of the age- and sex-specific rates in whites), may be considered as a Poisson variable, and 95 percent confidence limits were calculated on this ratio (16). For PMR analyses of blacks versus whites for each cause of death within each age and sex stratum, either chi-square (with continuity correction) or Fisher's exact test (two-tailed) was used depending upon the expected numbers. Although PMRs may be misleading indicators of cause-specific mortality because of the absence of data on absolute rates within educational level, an age standard PMR may approximate a "relative" standardized mortality ratio (SMR) (that is, a cause-specific SMR divided by an SMR for all causes) (17).

Results

Death rates for women. For women the black-white ratio of death rates for all causes was highest at ages

35–44 and declined with age, reaching less than 1.00 at age 75 or more years (table 2). Black-white ratios for diabetes mellitus for women were consistently elevated across all age groups and significantly greater than 1.00 for most age groups. Black-white ratios for ischemic heart disease were significantly elevated in younger women (less than 65 years) and decreased with advancing age, reaching a significantly reduced level in the oldest age groups. For cerebrovascular diseases, the black-white ratios were also elevated from ages 35–44 to 65–74 years.

Death rates for men. For men, the black-white ratio of death rates for all causes also decreased with advancing age. Deaths due to diabetes mellitus for black men were few; the black-white ratio was consistently elevated at all ages but statistically significant only for ages 45–54. In contrast to women, black-white ratios for ischemic heart disease were not significantly elevated for men and decreased only slightly with advancing age. For cerebrovascular diseases, black-white ratios were significantly elevated for age groups 35 through 64 and decreased in magnitude with advancing age, as shown for women (table 2).

PMRs. Age- and sex-specific PMRs for diabetes, ischemic heart disease, and cerebrovascular disease by educational level are shown in table 3. Noteworthy are the higher PMRs for diabetes within each educational level for black than for white women. For ischemic heart disease, PMRs were not higher for black than white women within educational level, while for men the PMR was consistently low for blacks. PMRs for cerebrovascular disease were slightly higher for blacks versus whites in most age groups, but significantly high only for men in the lower educational group; for men, black-white differences were small in the higher educational group. For women, PMRs for cerebrovascular disease were slightly higher for blacks than for whites but significantly higher only in one age-education group.

Discussion

These findings indicate substantial black-white differences in mortality from all causes and from major chronic diseases, especially among young adults, in an area where both blacks and whites have incomes above the U.S. median. The importance of examining age-specific, rather than age-standardized, death rates is emphasized. Black-white ratios of age-specific mortality rates decrease with advancing age from the 35–44-year group to 75 years (table 2) and reach less than 1.00 in the oldest age group—except for diabetes for

each sex and cerebrovascular disease for men. Similarly, in the United States, death rates for "heart disease," cerebrovascular disease, and diabetes mellitus are higher for young black versus white adults, and these contribute to the high black-white ratio of years of potential life lost (18).

Diabetes mellitus. Obesity among young, adult U.S. black women may be an underlying factor in the elevated prevalence rates (19) and mortality from diabetes mellitus, especially for ages 45–54 and 55–64 years (table 2). In Suffolk County, the PMR for diabetes was higher for black than white women in each of two broad educational groups (that is, less than 12 and 12 or more years, table 3). This finding may reflect inadequate control for socioeconomic status or black-white differences in obesity prevalence for women that are independent of poverty status (20) or educational level (21). The factors contributing to obesity among U.S. black women are poorly understood (22). As suggested by studies of another U.S. minority group at high risk of diabetes, the Zuni Indians, local community programs involving exercise and dietary components and cognizant of sociocultural factors (23), including attitudes and perceptions regarding obesity (among black women) (24), may prove effective in disease control among black diabetics.

Cerebrovascular disease. The age and sex pattern of black-white differences in mortality from cerebrovascular diseases probably reflects in part the large black-white differences in prevalence of hypertension for U.S. men and women between 35 and 64 years of age (25). In Evans County, GA, controlling for both social class and hypertension removed all the excess mortality from cardiovascular diseases (which was mainly due to the subcategory of cerebrovascular disease) for black versus white women (26). Although poverty is associated with hypertension (20), U.S. black-white differences in hypertension prevalence hold for each educational level (25). The higher PMR for cerebrovascular diseases for Suffolk County blacks versus whites within the low education group, statistically significant only among males, suggests the possible role of poor medical care and noncompliance with medication in this population subgroup (27–30). On the basis of other studies, lack of awareness of the importance of hypertension (31) or lack of recent blood pressure tests (32) among less educated blacks are probably not involved.

Continuing black-white disparities in mortality from cerebrovascular diseases in the United States and in a high income area (that is, Suffolk County, table 2), despite increases in hypertension control among blacks

Table 3. Proportional mortality ratios (PMRs) in Suffolk County, NY, by race, sex, and educational level (less than 12 versus 12 or more years) of decedents 35 years of age and older

Race and age group (years)	Diabetes		IHD		Cerebrovascular		Total
	Number	PMR	Number	PMR	Number	PMR	Number
Education <12 years—women							
35–54:							
White...	2	0.9	28	12.9	16	7.4	217
Black...	3	3.4	11	12.4	7	7.9	89
55–64:							
White...	15	3.1	141	29.2	31	6.4	483
Black...	3	4.1	22	29.8	5	6.8	74
65–74:							
White...	56	3.6	531	34.4	94	6.1	1,543
Black...	7	6.7	30	28.6	14	13.3	105
75 or older:							
White...	165	2.8	2,703	45.6	748	12.6	5,923
Black...	12	17.6	60	38.0	26	16.5	158
Education 12 years or more—women							
35–54:							
White...	14	1.1	138	10.4	65	4.9	1,321
Black...	2	2.0	9	8.9	7	6.9	101
55–64:							
White...	32	1.8	326	18.7	88	5.0	1,743
Black...	6	19.2	17	26.2	6	9.2	65
65–74:							
White...	62	2.4	732	28.3	177	6.8	2,583
Black...	0	0.0	16	27.6	8	13.8	58
75 or older:							
White...	84	1.7	1,032	41.9	677	14.0	4,847
Black...	11	112.8	28	232.6	11	12.8	86
Education <12 years—men							
35–54:							
White...	5	1.2	131	30.5	11	2.6	430
Blacks...	2	1.6	19	115.6	9	27.4	122
55–64:							
White...	28	3.0	339	35.9	34	3.6	945
Black...	5	3.9	36	27.9	8	6.2	129
65–74:							
White...	51	2.5	735	35.6	101	4.9	2,063
Black...	1	0.7	36	226.1	14	210.1	138
75 or older:							
White...	71	1.8	1,607	40.9	386	9.8	3,932
Black...	3	2.0	54	36.0	21	14.0	150
Education 12 years or more—men							
35–54:							
White...	21	1.1	603	32.3	51	2.7	1,874
Black...	3	2.3	20	115.6	7	5.5	128
55–64:							
White...	55	2.1	974	36.6	94	3.5	2,662
Black...	2	2.3	23	26.4	5	5.7	87
65–74:							
White...	70	2.2	1,187	36.9	173	5.4	3,217
Black...	5	27.6	22	33.3	2	3.0	66
75 or older:							
White...	66	1.8	1,409	39.4	366	10.2	3,580
Black...	2	2.9	17	225.0	4	5.9	68

¹P<.01.

²P<.05, chi-square or Fisher's exact test.

NOTE: For ICD codes, see text; IHD = ischemic heart disease.

(33, 34), indicate the need for continued public health efforts, and perhaps developing treatment programs targeted at young black males (table 2) with less than a high school education (table 3). In Suffolk County, community-based studies of awareness and treatment of hypertension, as among enrollees at eight county-supported health centers serving mainly low-income residents (including blacks), could be rewarding.

Ischemic heart disease. Black-white ratios of death rates from ischemic heart disease at ages 35 to 64 years were high in women but not in men (table 2). Within each educational level, PMRs for ischemic heart disease were lower for black versus white males but similar for black versus white women. Since U.S. black-white differences in the prevalence of hypertension are highest from ages 35 to 64 years for both men and women (and in each educational level) (25), the different sex-specific mortality pattern for ischemic heart disease versus cerebrovascular disease could represent diagnostic confusion (especially in young-adult women) between ischemic heart disease and hypertension-related diseases (15). In this regard the black-white ratios of death rates for cerebrovascular disease were ostensibly lower for women than for men from ages 35–44 to 55–64 (table 2), despite even larger U.S. black-white differences for women than for men in the prevalence of “definite” hypertension at these ages (25). Alternatively, the high prevalence of obesity and diabetes mellitus among young-adult black women at each level of education or poverty could influence the risk of ischemic heart disease (and mortality from the disease) before age 65 years. Once hypertension prevalence in U.S. blacks and whites equalizes after age 64 years (25), certain factors protective against ischemic heart disease among blacks (such as cholesterol fractions) could result in lower black-white mortality ratios.

Surveys of obesity, smoking, and hypertension prevalence and treatment of hypertension by level of education and income among young-adult blacks and whites by region (such as Suffolk County) would be useful in interpreting differences in ischemic heart disease and cerebrovascular disease mortality by regions and by race within region. Surveys of cardiovascular risk factors (7, 8) at the State level should be supplemented by regional surveys. New York State ranked first among all States in ischemic heart disease death rates for both men and women (all races combined) for ages 35–64 years in 1985, with rates about 25 percent higher than for the United States (6). Average annual ischemic heart disease death rates for Suffolk County white men and women 35 through 64 years in 1979–83, however, were only slightly higher than those calculated (not shown) for the United States using vital statistics data (35)—for women, for example, rates were 8.9 per

100,000 for Suffolk County versus 8.4 for U.S. whites (or a ratio of 1.06) at ages 35–44, 46.5 versus 45.4 (or a ratio of 1.02) at ages 45–54, and 208.9 versus 174.2 (or a ratio of 1.20) at ages 55–64 years. The discrepancy in death rates between Suffolk County and New York State as a whole could be due to the earlier onset of the decline in death rates from ischemic heart disease among whites in geographic areas with the highest levels of income and education (36).

Black-white ratios of age-specific death rates from ischemic heart disease were also similar for Suffolk County and U.S. females and males for most age groups (not shown), but community-based validation studies of data on mortality from ischemic heart disease are needed among blacks and whites (15) to assess the accuracy of death certification nationally and regionally. National hospital discharge data showing lower use of coronary arteriography and coronary artery bypass surgery for acute myocardial infarction among blacks than whites ages 35–74 (37), which could influence black-white differences in ischemic heart disease mortality rates, should also be examined for regional variation.

Conclusion

In U.S. cities, underemployment differentials between black and white young adults increased between 1970 and 1982 (38). Occupational mobility has occurred for trained and educated U.S. blacks, but lack of opportunity continues for blacks with low socioeconomic status (39). Consistent with this trend, in Suffolk County the black-white disparity in the proportion of the population at the poverty level was comparable to that in the United States, but there was much less black-white disparity in the mid-range of family incomes or in median family income in Suffolk County than in the United States (table 1). The black-white poverty differential may explain the high black-white ratios of death rates for certain chronic diseases associated with poverty, even in a high income area like Suffolk County.

Among young adults (ages 35–64 years) in Suffolk County, however, death rates for ischemic heart disease were nearly equal for black and white men but significantly higher for black versus white women. PMRs for ischemic heart disease within educational level were actually lower for black than white men but were equal for black and white women. Black-white differences in PMRs for diabetes mellitus among women persisted within educational level. These data suggest the possible importance of sex differences in risk factor prevalence (for example, obesity) independent of education or income, but this hypothesis requires further study.

Intervention programs including consideration of the perception of overweight in black women (24) may be important in primary and secondary prevention of both ischemic heart disease and diabetes mellitus. The higher PMRs for cerebrovascular disease for black versus white men with less than 12 years of education require investigation in terms of risk factors and treatment of hypertension.

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